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(19) and the head space (23) in the container but preventing any substantial leakage of paint.

(54) Containers for paint

(57) In a container for paint having a lid (10) provided with an aperture (201) which communicates with the atmosphere, a subsidiary member such as a sheet of foil with punctures or a disc valve (25) is provided on the underside of the lid so as to form an intermediate chamber (19) communicating with the atmosphere through the aperture (201), the intermediate member (25) allowing equalisation of gas pressure between the intermediate chamber

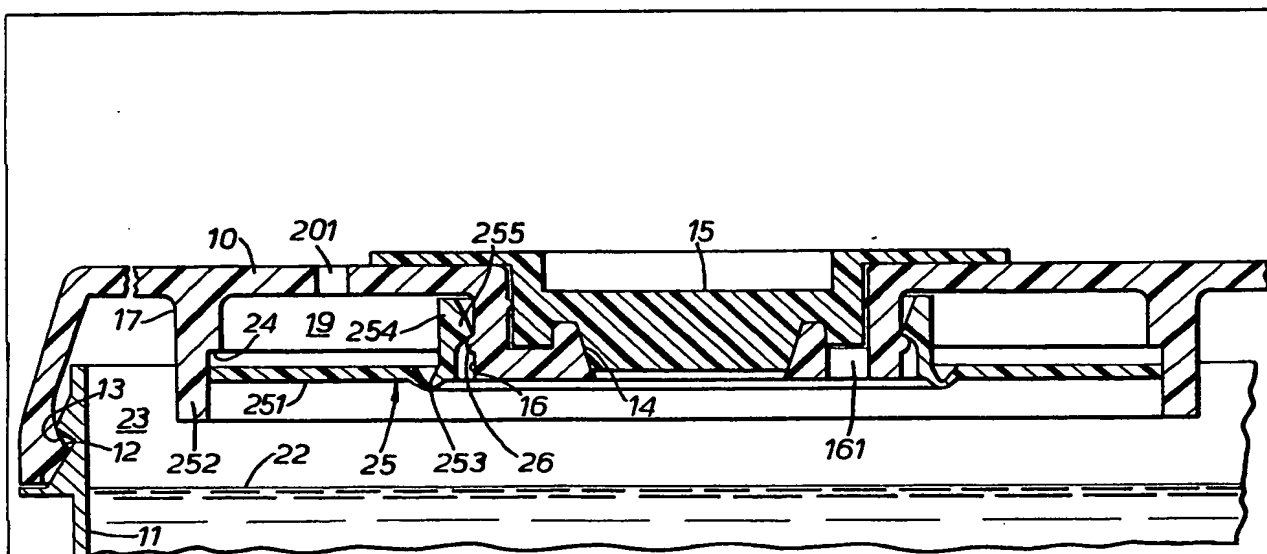


Fig. 2.

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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

SPECIFICATION

Containers for paint

5 This invention relates to containers for paint. It is particularly, though exclusively, concerned with containers for paint having a lid which has a central opening normally closed by a plug which is removable to allow insertion through the opening of a tightly-fitting paint dispensing tube; application of external gas pressure through a secondary opening to one side of the main opening, which is also normally closed by the plug, causes the paint to be dispensed through the tube. Once the tube has been inserted, the lid must provide a hermetic closure of the container so that the paint can be forced out by the gas pressure.

10 In practice, if the lid provides a hermetic closure at all times, problems have been encountered when applying the lid to the container after the container has been charged with paint, in that the air in the head space above the paint is compressed so that the lid tends to bulge. Also, if the container is re-closed by means of the plug after part of the paint has been used, absorption of gas from the head space into the paint can occur, causing a reduction in internal pressure which can result in inward distortion or "panelling" of the container. Provision of an aperture in the lid communicating with the atmosphere on the outside and the head space on the inside would involve risk of spillage of the paint as well as shortening the shelf life of the paint by providing access of air to it.

15 It is an object of the invention to provide a container for paint as referred to above which will afford equalization of internal and external gas pressures at all times without risk of spillage of the paint.

20 According to the invention, in a container for paint having a lid provided with an aperture which communicates with the atmosphere outside the container, a subsidiary member is provided on the underside of the lid so as to form an intermediate chamber which is in communication with the atmosphere through the said aperture, the subsidiary member being adapted to allow equilization of gas pressure between the intermediate chamber and the head space above paint in the container but to prevent any substantial leakage of paint into the intermediate chamber. Preferably the underside of the lid is formed with an annular downwardly extending wall and the subsidiary member coacts with the annular wall to form the intermediate chamber. In the kind of container with which the invention is particularly concerned, the lid may have a removable central plug fitting in an opening in a downwardly projecting central boss which lies within the annular wall.

25 In one embodiment of the invention, the subsidiary member is a sheet of foil provided

with one or more punctures which is or are capable of allowing equalization of gas pressure but which is or are sufficiently small to be sealed by any paint which endeavours to leak through. The sheet of foil may be attached to the lower extremity of the annular wall, and in this case the aperture may be provided in the central plug mentioned above.

30 In an alternative embodiment of the invention, the subsidiary member is a disc valve which can flex to open a small gap which will allow the equalization of gas pressure but which is small enough to prevent passage of any substantial quantity of paint. The disc valve may comprise a flexible annulus whose outer edge is an interference fit within the inner surface of the annular wall so that, on flexing of the annulus, the small gap is opened between the annular wall and the annulus. The inner surface of the annular wall may be formed with a step which limits flexing of the annulus towards the lid so as to form a seal against leakage of paint if the container is inverted. Preferably the annulus is connected to a substantially cylindrical part of the disc valve fitting around the central boss, for example through an elbow portion of substantially reduced material thickness which provides flexibility in the connection and thus allows for any eccentricity of the central boss in relation to the annular wall.

35 Specific embodiments of the invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which:

40 *Figure 1* is a vertical cross-section through the lid and upper part of the wall of a container in accordance with a first embodiment, and

45 *Figure 2* is a similar view of a second embodiment.

50 The invention makes use of the peculiar properties of paint, in that it has strong wet film strength, good wetting properties, good penetration and flow properties and the ability to set quickly. Consequently, small punctures and gaps which are large enough to vent air effectively can nevertheless be quickly blocked with paint.

55 In the embodiment shown in Fig. 1, the lid 10 fits downwards on to the top of the container wall 11, being retained by mating formations 12, 13. The lid has a central opening 14 normally closed by a plug 15 which is removable to allow insertion of a paint dispensing tube (not shown) which fits tightly in the opening 14. The plug 15 is retained in a central boss 16 depending from the underside of the lid 10. A secondary opening 161 is formed in the boss 16 to one side of the main opening 14 and is also closed by the plug 15 when the latter is in position. In order to enable internal and external pressures to be equalized without risk of spillage of paint from the container, an annu-

lar wall 17 is provided, extending downwards from the underside of the lid 10, and a foil 18, e.g. of 50 micron thick polypropylene laminated to 50 micron thick aluminium, is heat sealed or otherwise bonded to the lower extremity of the wall 17 to form with it an intermediate chamber 19. An aperture 20 is provided in the lid 10. In this case illustrated it is in the plug 15 but it could also be in a fixed part of the lid so long as it keeps the intermediate chamber 19 in permanent communication with the outside atmosphere. The foil 18 is formed with one or more pinholes or punctures 21, e.g. of 125 to 150 microns diameter.

When the lid 10 is fitted down on to the container wall 11 after the container has been charged with paint 22, the air in the head space 23 above the paint is compressed but the compressed air can escape through the pinholes 21 into the intermediate chamber 19 and thence through the aperture 20 to equalise the gas pressures. Paint cannot escape through the pinholes 21 to any substantial extent, however, because of its tendency to form a film and thus to block any pinhole through which it might endeavour to leak.

When the paint is to be used, the container is placed in an outer vessel (not shown), the plug 15 is removed and a paint dispensing tube is push-fitted into the opening 14 and through the foil 18 (which it ruptures), until its free end is located adjacent to the bottom of the container. The outer vessel is then pressurised, e.g. by connection to a source of compressed CO₂ gas. The pressure communicated through the secondary opening 161 forces the paint out through the dispensing tube to an applicator.

If the dispensing tube is removed and the plug 15 is replaced after part of the paint has been used, any tendency for pressure to be reduced in the container by absorption of gas is avoided by venting through the ruptured foil 18 and aperture 20.

In the embodiment shown in Fig. 2, the lid 10, container wall 11 and plug 15 are similar to those of Fig. 1, except that the aperture, here referenced 201, is formed in the fixed part of the lid 10 rather than in the plug 15, and the annular wall 17 has a step 24 on its inner surface. The foil 18 of Fig. 1 is here replaced by a disc valve 25 which comprises a flexible annulus 251 whose outer edge 252 makes an interference fit with the inner surface of the annular wall 17. The inner edge of the annulus 251 is connected through a circular elbow portion 253 of reduced material thickness to a vertical substantially cylindrical part 254 of the disc valve 25, having a head 255 which is a snap fit behind a bead 26 on the central boss 16. The disc valve 25 may be made of a 7% ethylene vinyl acetate/polyethylene copolymer. The flexibility of the elbow portion 253 enables the cylindrical part

254 to adapt itself to any eccentricity of the exterior of the central boss 16 in relation to the interior surface of the annular wall 17, by moving laterally relative to the annulus 251 without upsetting the interference fit of the annulus within the wall 17.

When the lid of Fig. 2 is fitted to a container charged with paint 22, the compression of the air in the head space 23 causes the annulus 251 to flex upwardly, thus breaking the interference fit and opening a small gap between its outer edge 252 and the inner surface of the annular wall 17 and allowing equalization of the gas pressure with atmosphere through the intermediate chamber 19 and aperture 201. If the container is inverted, the paint will force the annulus 251 against the step 24 and the paint will not leak past it to any substantial extent. Any leakage will be contained in the intermediate chamber 19.

After part of the paint 22 has been used, if the paint dispensing tube is removed and the plug 15 is replaced, any reduction of pressure in the container due to absorption of air will flex the annulus 251 downwards until a small gap is again opened between its outer edge 252 and the wall 17 and gas pressures are equalised. Any paint film which has formed will be ruptured by the flexing of the annulus 251 thus allowing passage of the air.

CLAIMS

1. A container for paint having a lid provided with an aperture which communicates with the atmosphere outside the container, wherein a subsidiary member is provided on the underside of the lid so as to form an intermediate chamber which is in communication with the atmosphere through the said aperture, the subsidiary member being adapted to allow equalization of gas pressure between the intermediate chamber and the head space above paint in the container but to prevent any substantial leakage of paint into the intermediate chamber.

2. A container according to claim 1 wherein the underside of the lid is formed with an annular downwardly extending wall and the subsidiary member coacts with the annular wall to form the intermediate chamber.

3. A container according to claim 2 wherein the lid has a removable central plug fitting in an opening in a downwardly projecting central boss which lies within the annular wall.

4. A container according to any one of the preceding claims wherein the subsidiary member is a sheet of foil provided with one or more punctures which is or are capable of allowing equalization of gas pressure but which is or are sufficiently small to be sealed by any paint which endeavours to leak through.

5. A container according to claim 4 as

appendent to claim 2 or 3 wherein the sheet of foil is attached to the lower extremity of the annular wall.

6. A container according to claim 5 as
5 appendent to claim 3 wherein the aperture is provided in the plug.

7. A container according to any one of
claims 1 to 3 wherein the subsidiary member
10 is a disc valve which can flex to open a small gap which will allow the equalization of gas pressure but which is small enough to prevent passage of any substantial quantity of paint.

8. A container according to claim 7 as
15 appendent to claim 2 or 3 wherein the disc valve comprises a flexible annulus whose outer edge is an interference fit within the inner surface of the annular wall so that, on flexing of the annulus, the small gap is opened between the annular wall and the
20 annulus.

9. A container according to claim 8
wherein the inner surface of the annular wall is formed with a step which limits flexing of the annulus towards the lid so as to form a
25 seal against leakage of paint if the container is inverted.

10. A container according to claim 8 or 9
as appendent to claim 3 wherein the annulus
30 is connected to a substantially cylindrical part of the disc valve fitting around the central boss.

11. A container according to claim 10
wherein the annulus is connected to the central part through an elbow portion of substantially reduced material thickness.
35

12. A container substantially as hereinbefore described and as illustrated in Fig. 1 or Fig. 2 of the accompanying drawings.

13. A lid for a container according to any
40 one of the preceding claims.

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